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Screening for intellectual disability in Dutch psychiatrically disturbed detainees: Assessing the psychometric properties of the Screener for Intelligence and Learning Disability (SCIL)

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Abstract

Introduction: Intellectual disability is a key subject in all mental healthcare institutions, including the forensic mental health services. The Screener for Intelligence and Learning Disability (SCIL) is designed to screen for intellectual disability in forensic populations. So far, this assessment method is only validated in "detention fit prisoners" with low need of care. The aim of the present study was to investigate the psychometric properties of the SCIL in a population of mentally ill detainees with high need of care.

Materials and methods: Screener for Intelligence and Learning Disability scores, mental health reports including intelligence assessment, and criminal records of detainees were obtained. Reliability and validity of the SCIL were calculated, using the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV) and prior studies of the SCIL as a reference.

Results: Cronbach's alpha coefficient for the total SCIL was 0.72. The area under the receiver operating characteristics (ROC) curve was 0.84. Different cut-off values than the original were determined when achieving the optimum in true positives and negatives. The mean intelligence quotient (IQ) score of the study population was 82.6, and 60.3% could be classified with an IQ < 85.

Discussion: The SCIL gives a quick and accurate indication of whether a person is at risk for intellectual disabilities. Although both the reliability and validity of the SCIL are lower in the study population than in regular prison populations, for application of the SCIL in mentally ill detainees all psychometric properties could be classified as acceptable. When assessing the latter populations, it is recommended to use a cut-off value of 20.5 instead of the original 19.5. Additionally, it is advised to revise item 4. Finally, it is important to mention that the estimated prevalence of intellectual disability is the forensic population seems to be larger than expected.

KEYWORDS

assessment, forensic mental health, intellectual disability, neuropsychology, prison, validation

1 | INTRODUCTION

Intellectual disability is one of the most common developmental disorders (Maulik & Harbour, 2013). With numbers up to 45.0%, intellectual disability seems to be overrepresented in forensic populations compared to the general population (Holland & Persson, 2011; Holland, Clare, & Mukhopadhyay, 2002; McBrien, 2003). Intellectual disability is also overrepresented within the forensic mental healthcare facilities. It often co-occurs with other psychiatric disorders (Matson & Cervantes, 2014; Morgan, Leonard, Bourke, & Jablensky, 2008; Stavrakaki & Lunsky, 2007). Additionally, psychiatric disorders can adversely affect cognitive abilities (Cooper & Bailey, 2001; Sravakaki, 1999). Studies examining *delirium, dementia and amnestic and other cognitive disorders* (CD) and *schizophrenia and other psychotic disorders* (PD) concluded that the presence of these disorders influence acute cognitive performance (Diamond, Wang, Holzer, Thomas, & des Anges, 2001; Dias, Ware, Kinner, & Lennox, 2013).

Because detainees with intellectual disabilities experience more problems in their (pre-trial) detention than those without intellectual disabilities (Talbot, 2008b), it is important to detect this developmental disorder in an early stage of the judicial process, also when other psychiatric problems seem to be leading and disorders are hardly to differentiate. In particular, individuals with a borderline intellectual disability (intelligence quotient ranging from 70 to 85) are difficult to distinguish from those without intellectual disabilities, so that their conceptual, social and practical skills are easily overestimated and they run into problems. This can lead to (performance) anxiety, depression and a negative self-image or, on the contrary, aggressive and cross-border behaviour. As a result, they are more likely to develop psychopathology and behavioural problems compared to detainees without intellectual disabilities. Problems mainly arise in new, complex and ambiguous situations and support from the environment is then required. If treatment programmes offered are too ambitious and do not take this into account, this often leads to (further) disappointment and social disadvantages, such as unemployment, financial problems and problems with self-reliance (Loucks, 2007; Talbot, 2007, 2008a). Early detection of intellectual disabilities creates the possibility for customized care, better resocialization after detention and a decreased risk for crime recidivism (Kaal, Negenman, Roeleveld, & Embregts, 2011; Lofthouse et al., 2013).

In recent years, much research has been done on recognizing intellectual disabilities in forensic settings. Because of the high comorbidity with psychiatric disorders, there is a need for a valid assessment instrument to detect (borderline) intellectual disabilities in detainees who may also suffer from other mental disorders. One of the main barriers in this process is the complexity of prison populations which does not always allow intensive and time-consuming intelligence assessments (Jones, 2007; Lindsay et al., 2002; McKenzie, Michie, Murray, & Hales, 2012). Screening tools like the Hayes Ability Screening Index (HASI; Hayes, 2002), the Learning Disability Screening Questionnaire (LDSQ; McKenzie & Paxton, 2006), the Learning disabilities in the Probation Service (LIPS; Mason & Murphy, 2002a) and the Screener for Intelligence and Learning Disability (SCIL; Kaal, Nijman, & Moonen, 2013) may offer a solution. After all, they have been developed to give a quick and accurate indication of whether a person is likely to have an intellectual disability or not. A number of studies have examined the suitability of these instruments in various stages of the criminal justice process, including imprisonment (e.g. Hayes, 2002; McKenzie et al., 2012; Søndenaa, Palmstierna, & Iversen, 2010) and probation (e.g. Mason & Murphy, 2002b). However, study results showed that the HASI, LDSQ and LIPS are all developed to screen for indications of intelligence quotients (IQ) lower than 70 or 75 and are, therefore, not useful to screen for borderline intellectual disabilities. Additionally, the HASI is not feasible in forensic psychiatric populations (Søndenaa, Rasmussen, & Nøttestad, 2008).

The SCIL seems more promising. It is a structured interview that consists of 14 items related to education, contact with health services and family, and reading habits. In addition, the respondent needs to perform exercises regarding arithmetic, reading, writing, spelling and clock drawing. The SCIL is developed to create the possibility to screen in an easy and short way large groups of patients at various points in the criminal justice chain, to detect a possible intellectual disability. This relates to an IQ score lower than 85, further referred to as "at risk." An IQ score higher or equal to 85 referred to as "not at risk." Validation of the SCIL is done by assessing individuals from healthcare institutions providing services for clients with an intellectual disability (Moonen, Kaal, & Nijman, 2012). Following this validation study (Nijman, Kaal, van Scheppingen, & Moonen, 2016), the authors carried out a second study, to define the feasibility of the SCIL in regular penitentiaries (Kaal et al., 2013). Results show high reliability and validity. However, so far all penitentiaries which are included in research with the SCIL are equipped for "detention fit prisoners" (from here *regular prison populations*) with low need of care (Kaal et al., 2013). Because of the high prevalence of detainees with mental health problems (Sirdifield, Gojkovic, Brooker, & Ferriter, 2009), it is necessary to further investigate this instrument. Dutch detainees requiring extensive mental health care reside in one of four Penitentiary Psychiatric Centres (PPC), which specialize in psychiatric diagnosing and treatment.

The aim of the present study was to investigate the psychometric properties of the SCIL in a population of Dutch, mentally ill detainees. Based on the studies of Kaal et al. (2013) and Nijman et al. (2016), the present authors a priori hypothesized that the SCIL would show sufficient reliability and validity in the PPC population.

2 | MATERIALS AND METHODS

2.1 | Procedure and subjects

Diagnostic assessment is part of Routine Outcome Monitoring (ROM) of detainees in a PPC and is done by a psychologist. Assessing the SCIL is part of this. The retrospective data collection was organized

and monitored by the authors. Data from 2,221 detainees residing in one of the four PPC's from September 2013 till August 2015 were initially included in the present study. Mental health reports and criminal records of all individuals were obtained from the detainees' file. All files were screened and excluded when incomplete. Missing data were due to a short stay in a PPC (subject release before ROM could take place). From the 1,181 remained files, those missing a SCIL assessment were also excluded. Missing SCIL assessments were attributable to an acute psychiatric condition or language barrier of the subject. Additionally, individuals that were detained in a PPC multiple times within this period were only included in this study once. 492 files remained and were finally included in this study. Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV; Wechsler, 2008) scores were derived from the psychological assessments of the court investigations. This is not part of ROM and added to the procedure for the present study. The WAIS-IV had to be administered within a period of two years before or after assessing the SCIL. Of 219 of the included subjects, WAIS-IV scores were available. See Figure 1 for an overview of the procedure.

3 | MATERIALS

3.1 | Screener for intelligence and learning disability

The SCIL was developed and validated by Nijman et al. (2016)to screen large groups of patients in the criminal justice chain. The test can be completed in <15 min by prison staff members without special training. The SCIL consists of 14 items, where each item can be scored as 0, 1 or 2. A positive score (encoded by 1) represents an increased chance to be at risk, while a negative score (encoded by 0) represents a decreased chance to be at risk. A score of less than 19.5 on the SCIL (minimum score = 0, maximum score = 28) is an indication for an IQ score < 85. Validation of the SCIL was realized in a population of 318 individuals with an average IQ of 89.3 (*SD* = 15.5), recruited in organizations providing services for clients with educational and/or social problems with the aim to reach a sample of subjects whose IQs on average are not far from the cut-off score. Based on this sample, reliability and validity were determined. A Cronbach's alpha of 0.83, an inter-rater reliability of 0.85, a test–retest reliability (*r*) of .92, and a split-half reliability of 0.93 were reported. Sensitivity and specificity were found to be 82.0% and 89.0%, respectively. Following this validation study, the authors carried out a second study, to define the feasibility of the SCIL in regular penitentiaries (Kaal et al., 2013). In this latter study, SCIL scores of 170 detainees were compared to full scale intelligence outcomes to assess the ability to discriminate between those with an IQ-score < 85 and ≥85. Kaal et al. (2013) found an area under the curve of 0.93 and a sensitivity and specificity of 88.0% and 83.0%, respectively. No further psychometric properties were calculated.

3.2 | Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV)

The WAIS-IV is the standardization of the widely used assessment of adult intelligence. It replaces the Wechsler Adult Intelligence Scale-Third Edition (WAIS-III; Wechsler, 1998). The Verbal and Performance IQs were replaced by four index scores: Verbal Comprehension, Perceptual Reasoning, Working Memory and Processing Speed. These index scores are in line with factor analytic studies of the WAIS-III (Taub, McGrew, & Witta, 2004) and the WISC-IV 3 (Wechsler, 2008) and, according to Wechsler (2008), give the test better clinical utility. The WAIS-IV produces all four index scores and the Full Scale IQ with ten subtests. The evidence for the reliability and validity of the WAIS-IV as outlined in the Technical and Interpretive Manual (Wechsler, 2008) seems excellent. The main reliability figure based on the standardization sample for Full Scale IQ was 0.98, which shows very good internal consistency. In addition, the test–retest reliability of 0.96 was found for Full Scale IQ when 298 were given the assessment twice with a mean interval of 22 days. 4 Considerable evidence is also presented with regard to

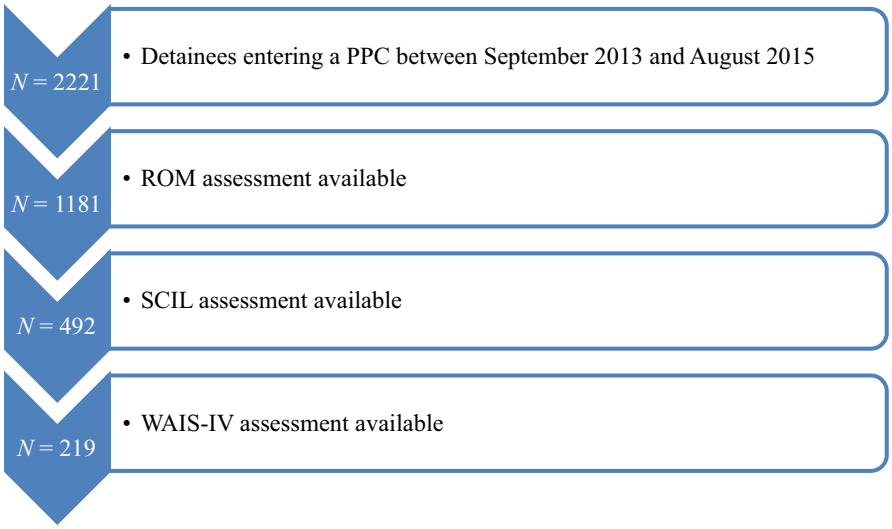

FIGURE 1 Procedure in- and exclusion of subjects. PPC, Penitentiary Psychiatric Centre; ROM, Routine Outcome Monitoring; SCIL, Screener for Intelligence and Learning Disability; WAIS-IV, Wechsler Adult Intelligence Scale-Fourth Edition [Colour figure can be viewed at wileyonlinelibrary.com]

the validity of the test. The test content is based on many years of experience and research in developing Wechsler assessments and expert opinion. Factor analytic studies (Wechsler, 2008) demonstrate that the assessment is a good measure of general intelligence or g and of the cognitive abilities measured in the index scales.

3.3 | Fourth edition of the diagnostic and statistical manual of mental disorders

Psychiatric diagnoses were determined by skilled psychologists and psychiatrists upon admission, using the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric Association, 1994) for the diagnostic classification, valid at the time of assessment.

3.4 | Ethical approval

Data were collected retrospectively; detainees were no longer hospitalized at the time the study was performed. Data collection is part of the ROM, which process is included in the house rules which patients receive upon arrival. The retrospective study is approved by the scientific department of the Dutch Ministry of Justice and Security with respect to procedural and ethical aspects. All data were anonymized before being analysed.

3.5 | Data analyses

3.5.1 | Power calculation

To find a medium effect size, with a power of 0.8 for each of the analyses (Cohen, 1988), at least 88 detainees needed to be included in the study. To perform reliability analyses, a minimum of 10 times the number of items is a requirement (Garson, 2008). With the SCIL containing 14 items, 140 detainees should be included. Power was calculated using a 95.0% confidence interval of the difference between the test scores.

3.5.2 | Psychiatric comorbidity

Because additional psychiatric disorders can adversely affect cognitive abilities, some calculations were performed for separate groups, based on diagnoses. Diagnoses in the category "schizophrenia and other psychotic disorders" were labelled as group PD. An independent *t* test between the detainees with and without a PD was performed to objectify the differences in IQ scores. Because there were only 3 detainees in de category "delirium, dementia and amnestic and other cognitive disorders" (CD), no separate calculations were performed for this group. A rest category (RC) was defined as the total sample minus all detainees with PD, CD or *postponed diagnosis*.

3.5.3 | Reliability

Cronbach's alpha coefficients were calculated to determine the internal consistency and split-half reliability of the SCIL. Results were interpreted according to Field (2017). A Cronbach's alpha of ≥0.8 was considered to be good; values between 0.7 and 0.8 were considered to be acceptable. Inter-rater reliability was estimated using a *t* test analysis. Test–retest reliability could not be examined as this is a retrospective study.

3.5.4 | Content validity

A factor analysis was performed, to get a representation of the dimensions behind the items and to be able to advise, if possible, on optimization of the instrument. According to Garson (2008) using the following principles. Method: principal axis factoring (PAF); rotation: Varimax; criteria: eigenvalue >1; and scree plot: retain all components within the sharp descent. The Kaiser-Meyer-Olkin (KMO) measure, the Measure of Sampling Adequacy (MSA) and Bartlett's test of sphericity were used to verify the adequacy for the analysis, in which a KMO value ≥0.5 can be considered as acceptable (Field, 2017; Pallant, 2016). Correlation coefficients were interpreted according to Altman (1991), in which values >0.8 are defined as excellent and values >0.6 and ≤0.8 as substantial.

3.5.5 | Criterion validity

The performance of the SCIL was evaluated using receiver operating characteristic (ROC) curve analysis (Schoonjans, 1998). Areas under the ROC curve, with the corresponding 95.0% CI, were estimated using the parametric method. The optimal cut-off value was identified, and the true positive rate (TPR) and true negative rate (TNR) were calculated. The convergent validity was estimated by calculating the correlation coefficient (Altman, 1991) between the total scores of the SCIL and the WAIS-IV.

4 | RESULTS

4.1 | Study population

The number of included subjects after exclusion is 492 (see Figure 1); 93.9% males (mean age 36.1 years; *SD* = 10.4; range 18.8–68.4 years) and 6.1% females (mean age 33.2 years; *SD* = 9.0; range 21.2–53.6 years). The sex ratio for the entire PPC population is approximately 100 males to 9 females. The mean SCIL score of the total sample was 17.9 (*SD* = 5.4), with no significant difference between male and female detainees ($t = -0.84$ $p = .399$). The individual item scores of the SCIL were retrospectively found for 455 of the 492 detainees. None of these contained missing values. For 214 of the detainees, an IQ score of the WAIS-IV could be obtained from file information. The mean IQ score of this group was 82.6 (*SD* = 17.6; range

39–138), and 129 of the 214 detainees (60.3%) were classified with an IQ < 85. Of the latter, 51 (23.8%) had an IQ < 70. The time between assessment of the WAIS-IV and the SCIL was mean 3.4 months (*SD* = 6.9; WAIS-IV assessment between 10 months before to 24 months after SCIL assessment). The level of education of the detainees was, based on file information, classified using the following categories: *no completed education* (3.5%), *primary education* (28.9%), *secondary education* (35.8%), *vocational education* (14.8%), *professional education or higher* (3.3%) and *special education* (0.6%). More details of the study population with regard to IQ scores are shown in Table 1.

4.2 | Psychiatric comorbidity

All clinical diagnoses are shown in Table 2a. Most frequent primary psychiatric disorders (Axis I of the DSM-IV-TR) were *psychotic disorders* (39.4%), *substance-related disorders* (17.9%) and *disorders usually first diagnosed in infancy, childhood or adolescence* (11.6%). 215 detainees (43.7%) were diagnosed with two or more psychiatric disorders. Table 2b shows the personality disorders (Axis II of the DSM-IV-TR), with 181 detainees (36.7%) being diagnosed with at least one personality disorder. For 223 detainees (45.3%), the personality diagnosis was postponed; 98 detainees (17.9%) were not suffering from a personality disorder.

The mean age at time of assessment was 36.1 years (*SD* = 10.6; range = 18.9–68.4 years) within RC (N^{rc} = 259) and 35.2 years (*SD* = 9.7; range 20.1–61.5) within PD (*N* = 194). The mean scores of the SCIL were 17.6 (*SD* = 5.1; range 2–28) and 17.9 (*SD* = 5.7; range 4–28), respectively. For 126 of the 259 detainees in RC, a WAIS-IV score could be obtained from file information (see Figure 1). The mean IQ score of this category was 85.2 (*SD* = 18.4; range 39–138), and 69 detainees were estimated with an IQ of <85 (54.8%). Within PD, the mean IQ score was 77.9 (*SD* = 15.9; range 50–116; *N* = 73). Detainees with a PD had lower IQ scores compared with detainees without a PD (*t* = 2.83; *p* = .005).

4.3 | Reliability

4.3.1 | Internal consistency

Cronbach's alpha coefficient for the total SCIL was 0.72. Excluding detainees suffering from psychotic or cognitive disorders and those for whom diagnosis was postponed, α = 0.74. Only a slightly higher Cronbach's alpha within the total data set could be reached when removing item 4 (α = 0.74). Item 4 is described as follows: "Do you have family members or relatives where you can go to if you have problems?"

Table 3 shows the percentage of detainees scoring positive on each of the separate SCIL items. Percentages range from 57.1% to 91.0%, with a notable exception for item 6 where only 23.1% of the detainees scored positively. Item 6 is formulated as follows: "Imagine you're on January 19 at the doctor and he wants a follow-up appointment in 3 weeks, what date will this be?" The mentioned 23.1% is excessively low considering the prevalence of intellectual disabilities in this group of 60.3%.

4.3.2 | Split-half reliability

Reliability analyses showed a Spearman–Brown coefficient of 0.71 when splitting the SCIL in items 1 to 7 and items 8 to 14. Removing item 4 ensures the highest correlation of 0.76. Because the SCIL is constructed subject-wise, reliability analyses were also performed splitting the SCIL alternately. A slightly decrease in reliability is shown, with a Spearman–Brown coefficient of 0.68 and an increase to 0.71 when removing item 4.

4.3.3 | Inter-rater reliability

Because each SCIL was assessed by only one psychologist at the time, it was not possible to calculate Cronbach's alpha from current file information. There were different psychologists working at the different locations. Between them, no significant differences were found (*t* (492) = 0.20; *p* = .842).

4.4 | Validity

4.4.1 | Content validity

The KMO measure verified the sampling adequacy for the analyses with an excellent correlation of 0.82. The MSA showed that all KMO values for individual items ranged between 0.52 and 0.89 and are, therefore, all considered to be acceptable. Bartlett's test of sphericity verified that factor analysis can be undertaken, since the value is <0.5 (χ^2 = 842.63, *df* = 91, *p* < .001). Four factors have an eigenvalue

TABLE 1 Specification WAIS-IV TIQ by gender

	Male		Female		Total	
	Frequency (*N*)	Percentage (%)	Frequency (*N*)	Percentage (%)	Frequency (*N*)	Percentage (%)
TIQ < 70	47	24.0	4	22.2	51	23.8
70 ≤ TIQ <85	71	36.2	7	38.9	78	36.4
TIQ ≥ 85	78	39.8	7	38.9	85	39.7
Total	196	100	18	100	214	100

TABLE 2 (a) Psychiatric disorders—main diagnosis. (b) Personality disorders—main diagnosis

(a)		
Category	**Frequency (*N*)**	**Percentage (%)**
Disorders usually first diagnosed in infancy, childhood or adolescence	57	11.6
Delirium, dementia and amnestic and other cognitive disorders	3	0.6
Mental disorders due to a general medical condition	1	0.2
Substance-related disorders	88	17.9
Schizophrenia and other psychotic disorders	194	39.4
Mood disorders	38	7.7
Anxiety disorders	22	4.5
Somatoform disorders	1	0.2
Factitious disorders	1	0.2
Sexual and gender identity disorders	10	2.0
Eating disorders	1	0.2
Impulse-control disorders	6	1.2
Adjustment disorders	26	5.3
Postponed diagnosis	36	7.3
No diagnosis	8	1.6
Total	492	100
(b)		
Kolom1	**Frequency (*N*)**	**Percentage (%)**
Cluster A	8	1.6
Cluster B	92	18.7
Cluster C	7	1.4
PD NAO	74	15
Postponed diagnosis	223	45.3
No diagnose	88	17.9
Total	492	100

Abbreviations: Cluster A, paranoid, schizoid and schizotypal personality disorder; Cluster B, antisocial, borderline, histrionic and narcissistic personality disorder; Cluster C, avoidant, dependent and obsessive–compulsive personality disorder.

TABLE 3 Answers on separated SCIL items

Total *N* = 455	**SCIL 1**	**SCIL 2**	**SCIL 3**	**SCIL 4**	**SCIL 5**	**SCIL 6**	**SCIL 7**
Negative score (%)	33.6	39.1	11.4	24.4	16.0	76.9	25.7
Positive score (%)	66.4	60.9	88.6	75.6	84.0	23.1	74.3
	SCIL 8	**SCIL 9**	**SCIL 10**	**SCIL 11**	**SCIL 12**	**SCIL 13**	**SCIL 14**
Negative score (%)	34.1	35.6	42.9	15.4	21.8	9.0	27.7
Positive score (%)	65.9	64.4	57.1	84.6	78.2	91.0	72.3

of >1.0 after rotation, which means they explain more variance than a single variable. The percentage of variance explained by the four factors was 29.5%. However, considering the factor loadings, it is shown than the items that cluster the same factors suggest that factor 1 represents almost all items. Factor 2 represents items 1, 2 and 3, factor 3 represents only item 9, and factor 4 represents only item 4. After removing item 4, 29.6% of the variance can be explained by 3 factors (factor 2: items 1, 2 and 3; factor 3: items 9 and 12; and factor 1: remaining items). KMO value did not change, and values for individual items were ranging between 0.65 and 0.89 afterwards.

4.4.2 | Criterion validity

Concurrent and convergent validity analyses were calculated for the 214 detainees, for whom both SCIL and IQ scores were available (see Figure 1).

The ROC curve analysis showed the area under the curve was 0.84 (N = 214 p < .001), indicating a significant ability to discriminate between at risk and not at risk in the study population, at a 95.0% confidence interval. The SCIL cut-off value obtained from the original standardization sample (cut-off = 19.5) gave a sensitivity of 72.0% and a specificity of 77.0%. Using this cut-off value in the total sample, 56.7% (N = 279) of the study population would be at risk. Selecting the 214 detainees with available WAIS-IV results (see *study population*), 52.8% (N = 113) would be at risk. According to the WAIS-IV scores, 60.3% can be classified as such (IQ < 85).

The optimal cut-off value based on the ROC surface would be 17.5, with a sensitivity of 60.5% and a specificity of 90.6%. When increasing the cut-off value to 20.5, the sensitivity was 76.7% and the specificity 72.9%. This cut-off value gives a higher sensitivity and a higher optimum compared to the original cut-off value. Using a cut-off value of 20.5, 57.9% (N = 124) of the selected detainees (N = 214) and 63.8% (N = 314) of all the detainees would be at risk. These latter results are more consistent with the WAIS-IV scores (see Table 4 for all predictive values).

Because reliability analyses show higher reliability when removing item 4 of the SCIL, ROC curve analyses were calculated for the SCIL without this item as well. The area under the curve was found to be 0.84 (N = 177 p < .001), which is similar to the result including item 4. The optimal cut-off value based on the ROC surface would be 16.5, with a TPR of 64.8% and a TNR of 87.0%. When a higher TPR over the TNR is required, the preferred cut-off value could be estimated on 17.5 or 18.5, increasing TPR to 70.4% (TNR 79.7%) and 73.9% (TNR 73.9%), respectively.

Convergent validity was indicated by a significant Pearson's correlation between the SCIL scores and the IQ scores (r = .66; p = .01). An independent t test revealed that the SCIL score of those who were at risk (mean (129) = 15.6 SD = 5.5) based on the independent IQ score was significantly lower (t = 10.41 p < .001) than those who were not at risk (M (85) = 22.2 SD = 3.8).

TABLE 4 Predictive values SCIL

Cut-off value	Sensitivity (%)	Specificity (%)	Optimum
1.5	0.0	100	1.00
2.5	0.0	100	1.00
3.5	0.8	100	1.01
4.5	2.3	100	1.02
5.5	5.4	100	1.05
6.5	8.5	100	1.09
7.5	9.3	100	1.09
8.5	10.9	98.8	1.10
9.5	14.0	98.8	1.13
10.5	19.4	98.8	1.18
11.5	22.5	98.8	1.21
12.5	27.9	98.8	1.27
13.5	36.4	98.8	1.35
14.5	40.3	97.6	1.38
15.5	45.7	94.1	1.40
16.5	57.4	92.9	1.50
17.5	60.5	90.6	1.51
18.5	65.9	83.5	1.49
19.5 (current cut-off value)	72.1	76.5	1.49
20.5	76.7	72.9	1.50
21.5	84.5	60.0	1.44
22.5	90.7	50.6	1.41
23.5	93.0	40.0	1.33
24.5	96.1	28.2	1.24
25.5	100	23.5	1.24
26.5	100	10.6	1.11
27.5	100	5.9	1.06
29.0	100	0.0	1.00

5 | DISCUSSION

5.1 | Interpretation of results

The aim of this study was to investigate the psychometric properties of the SCIL in a population of Dutch, mentally ill detainees residing in a PPC. Based on the studies of Kaal et al. (2013) and Nijman et al. (2016), the present authors a priori hypothesized that the SCIL would show sufficient psychometric properties in the PPC population. The study results confirmed this hypothesis. The internal consistency of the SCIL in the target population seemed to be substantial (α = 0.72), which is sufficient, but lower than in regular prison populations (α = 0.83). Additionally, it is shown that the occurrence of psychotic disorders within the research population did not influence this finding. The predictive value of the SCIL decreases when dividing the 14 items into components. Based on that finding, it was not feasible to draw any conclusions about different aspects of intelligence within this test, in contrast to full scale intelligence assessment. However, the present authors found that the ability of the SCIL to discriminate between the groups at risk and not at risk is lower within the PPC population than within regular prison populations. The optimum in determining true positives and true negatives is achieved at the cut-off value of 17.5 (sensitivity = 60.5%; specificity = 90.6%), while the cut-off value is 19.5 in the current manual (see Recommendations).

We found that the mean IQ score of the PPC population was lower than the mean IQ score of regular prison populations. Based on IQ scores of the WAIS-IV, 54.8% of the study population has an IQ lower than 85 and 19.8% an IQ lower than 70. These rates are higher than estimated in prior studies. The SCIL scores also support this finding. Based on the current cut-off value, 56.7% of the study population would be at risk for intellectual disabilities.

5.2 | Recommendations

5.2.1 | The psychometric properties of the SCIL

Given the higher prevalence of intellectual disabilities in the PPC population, a higher TPR is also expected when using the cut-off score based on prior research in populations with a lower intellectual disability prevalence rate. The current study results do not confirm this. The SCIL appears to be less sensitive in mentally ill detainees than in a regular prison population. Regarding the purpose of the instrument—a first screening for determining the presence of a possible intellectual disability—high sensitivity is more important than high specificity. However, the lower the sensitivity, the more critical costs and benefits must be compared regarding the imbedding of this instrument. A TPR value between 70.0% and 80.0% is generally considered to be acceptable (Glascoe, 2005). The above-mentioned cut-off value of 17.5 will therefore lead to an unacceptable sensitivity. Because a cut-off value of 20.5 will lead to a higher sensitivity (76.7%) and a higher total optimum in comparison with the current cut-off value of 19.5 (TPR = 72.1%), the present authors recommend using the cut-off value of 20.5 for use in mentally ill detainees. This would result in an at risk population of 57.9% instead of 52.8%. Because the prevalence of IQ < 85 determined by the WAIS-IV is 60.3%, using the cut-off value of 20.5 will lead to a more precise estimation. This could result, however, in the possibility of an increased rate of false positives.

Given the standardization, it might be recommended to distinguish between different age categories, gender and level of education (Wechsler, 2008). In addition, it could also be relevant to take cross-cultural differences into account and therefore standardize according to ethnic identity. However, since the SCIL contains a number of specific Dutch questions (proverbs-related), this latter would only apply in future translations.

5.2.2 | The content of the questionnaire

In the analyses, items 4 and 6 are more in contrast with the other items than the rest is. Based on this, the following advice is given on these items.

Item 4 is described as follows: "Do you have family members or relatives where you can go to if you have problems?" Two comments can be mentioned to explain the deviating value of item 4. First due to the division of the different subject of questions within the SCIL. Because detainees with an intellectual disability tend to have a limited social network and experience problems in maintaining contact with their family, Kaal, Nijman, and Moonen (2015) considered it to be necessary to include this ability of competence in the SCIL. The final questionnaire only contains one item related to this domain, while other domains are represented by multiple questions. Second, the formulation of the question concerning this domain is more ambiguous than others and, therefore, results in a wide variety in interpretation and answers (Kaal et al., 2015). When looking at item 4, the question arises whether the respondent should tell about his own potency to ask for help or the availability of his family to offer him help. Maybe Kaal et al. (2015) tried to merge both questions. This ambiguity can be explanatory for a reduced reliability. Although item 4 provides, in our opinion, no clear information, removing it from the SCIL is not recommended. It would not result in a significant higher reliability and validity analyses confirm values are high enough to include all separate items. We do recommend, however, to clarify this item in a following revised manual, any (English) translation, or to divide it into multiple questions, after which recalculations have to be done.

Item 6 is described as follows: "Imagine you're on January 19 at the doctor and he wants a follow-up appointment in 3 weeks, what date will this be?" This is an arithmetic question. Because *Arithmetic* is the subtest of the WAIS-IV with the highest correlation to the total IQ score of the WAIS-IV (Wechsler, 2008), it can be assumed that item 6 of the SCIL will have a higher correlation with the WAIS-IV compared to the other items of the SCIL. Looking at the results, there is evidence that confirms this expectation. However, according to the prevalence of detainees at risk, item 6 seems to overestimate this percentage (highly sensitive). The other items seem to underestimate this percentage. The assumption that arithmetic is the best predictor for IQ also in this case cannot be confirmed. However, because item 6 is most sensitive, it is important that this item remains included in the SCIL.

5.3 | Limitations

For this study, retrospective data were used. During the assessment period, psychiatric diagnoses were determined using the DSM-IV-TR for the diagnostic classification. This edition was valid at the time of assessment, but meanwhile the fifth edition (DSM-5; American Psychiatric Association, 2013) is being used in clinical practice. The DSM-5 emphasizes the need to use standardized testing when diagnosing intellectual disabilities, with the severity of impairment based on adaptive functioning rather than IQ test scores alone. The assessment of adaptive functioning across three domains (conceptual, social and practical) will ensure that clinicians base their diagnosis on the impact of the deficit in general mental abilities on functioning needed for everyday life. This is especially important in the development of a treatment plan. In the current study, the validity of the SCIL is determined based on the WAIS-IV score alone, which is the golden standard in assessing IQ but not in assessing adaptive functioning. In follow-up research, the latter must be included.

Because the procedure includes partly self-report questionnaires, there is a small possibility of malingering. However, considering the size of the studied population the impact of a person's malingering would be relatively small. Additionally, the present authors have tried to simulate the previous validation studies to minimize side effects; previously, this factor was not included. In follow-up research, this could might be prevented by adding malingering tests to the procedure.

6 | CONCLUSIONS

Although both the reliability and validity of the SCIL are lower in a population of mentally ill detainees than in regular prison populations, these psychometric properties are still acceptable. Based at the established validity, it is recommended to use the cut-off value of 20.5 instead of the original 19.5. Subsequently, it can be concluded that the SCIL gives a quick and accurate indication whether a person is at risk or not for intellectual disabilities in populations of mentally ill prisoners. It is not recommended to delete items from the current questionnaire, but it is advised to revise item 4. Due to the extremely high estimate of the prevalence of intellectual disabilities that appears in this study, further research needs to focus on the development of interventions targeting this group of mentally ill detainees with an intellectual disability. These interventions are necessary to improve the resocialization of these detainees will decrease risk to crime recidivism.

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